

Erin Welsh

Hi, I'm Erin Welsh and this is This Podcast Will Kill You. Welcome to another of our TPWKY Book Club episodes where we get to explore a science or medicine book beyond the pages by asking the author all sorts of questions for about 45 minutes or so. As you've probably heard me say, it's one of my favorite parts of putting this podcast together and I hope that you're enjoying it too. If you are or if you're not, we'd love to hear from you. Send us your thoughts, your unanswered questions, your book suggestions, your favorite selections, and anything else you want to tell us to us via the CONTACT US form on our website thispodcastwillkillyou.com.

Speaking of our website, did you know that you can find all of the books we've covered so far this season and last as well as the books that we'll be getting to later this year on our website? All you have to do is head over to our website and click on the link to our bookshop.org affiliate account under the EXTRAS tab. Once you're on Bookshop, you'll find various TPWKY associated book lists, including one for Book Club. Pro tip, these lists are great for finding future reads or picking out gifts for the bookworms in your life. So with that, shall we get into this week's book?

I am delighted to share with you all a book whose subject literally all of us can relate to, 'Why We Remember: Unlocking Memory's Power to Hold on to What Matters' by Dr. Charan Ranganath. In this fascinating and insightful book, Ranganath expertly guides readers through complex concepts of how memory works and what happens when it doesn't; how memories are formed, forgotten or forged, and what studying the mechanisms of our memory can tell us about our past as well as our present. An expert is no exaggeration. Dr. Ranganath is Professor of Psychology and Neuroscience and Director of the Dynamic Memory Lab at the University of California at Davis. And his work has investigated the neural underpinnings of how memories are made, what happens when we retrieve memories, and how things like emotions influence our recollection.

We've all had those moments where we can't remember where we put our keys or when we've typed in eight different passwords to that one random website we had to make an account for years ago only to get locked out on our ninth try, or when we struggle to remember that colleague's partner's name whom we met literally three minutes ago. I forget easily, easily 90% of some of the episodes we've released. Like don't ask me anything about arsenic at this point. And there have been at least a few times where Erin or I will suggest a topic that we've already done an episode on, having completely forgotten that we've already covered it. Sometimes it really does feel like our brain is sabotaging us, making us forget things that can be quite important like whether or not you turned the oven off as you sit on an international flight, while at the same time preserving the cringiest, most embarrassing, painful moments in exquisitely vivid detail so we can easily recall them at, say, 3am when we're tossing and turning and our anxiety is at its peak.

Complaining about our forgetfulness is a favorite pastime for many of us. But we don't often stop to consider why we remember in the first place and how examining the role of memory over our evolutionary history can help to answer that question. In 'Why We Remember', Ranganath delves into this question and guides readers down many other roads relating to memory, including how we remember, the differences between different types of memory, like how is remembering your 6th birthday different from recalling the date the Titanic set sail at your favorite bar's trivia night; how context like music or smell can strengthen our recall, the world of competitive memory, the unreliability of memory, how déjà vu works, and even ways we can work at improving our memory. The neuroscience of memory is, as you can imagine, an incredibly complex topic where it would be so easy to get lost in the weeds. But Dr. Ranganath ensures that doesn't happen with his wonderfully clear and engaging writing. This is sure to be an episode you won't forget, at least for a while anyway. So let's get right to it after this break.

TPWKY

(transition theme)

Erin Welsh

Dr. Ranganath, thank you so much for being here today. I absolutely devoured your book. I found it incredibly fascinating, could not put it down. And I wondered when did you decide I want to write a book about memory? And, two part, how did you first become interested in researching memory?

Charan Ranganath

Great two part question. I got actually a background in clinical psychology in graduate school. And so initially my work was on depression and I would see a lot of patients. And some of my time was actually seeing people, for instance, in treatment for depression or anxiety. And sometimes it was working in the neuropsychology clinic where people would be coming in and they'd be worried do I have Alzheimer's disease or maybe they had a car accident and an insurance claim and so forth. And so what was interesting is almost everyone who came into the neuropsychology clinic, whether or not it was their main problem, the thing that brought them in was almost always memory. They said they had a memory problem.

And when I was working with patients, what I found was early on I was working, for instance, my first patient was a phobia patient and he had a driving phobia. And so we worked through a lot of the mechanics of that which is basically just exposure to drive, drive, drive, drive. But he wasn't quite happy. And it wasn't until we really kind of got into a little bit of his memories around that time that he felt like he was really satisfied. And he had actually it turns out a falling out with his father right before this car accident. And it was all, at least for him, there is a deep link between them. And so it was just over and over again I would see these links to memory throughout my clinical practice, in my training that is, and at the same time there were these new advances coming up in brain imaging.

And what was great about that was that a lot of the way we were thinking about memory in the clinic was really not grounded in the best science that was around. It was more based on what was useful in the clinic. But I felt like if we can actually get into people's brains, we can really figure out what's going on. And so that's how I ended up getting into the world of memory research. And over the years I really felt like I wanted to write a book for regular people because I never really felt like I would have gone this road, I feel like a very unlikely scientist. And so I wanted to write something for everyone to share the science and where it's gone and what we've learned from it. And again that kind of stems back to my interests of bringing a scientific perspective back to a lot of the clinical work. And so I just didn't think I was ready yet, I didn't think I had the book in me yet, and I didn't think I had the time.

And my agent, Rachel, actually she had contacted me out of the blue in March of 2020. And so we had an appointment to get together, I think it was the second or the third week of March. And two days beforehand turned out we had to cancel it because of the lockdowns. And it was like the universe was just telling me to write this book. And then it really just became apparent to me just how much people need to hear from scientists, not just journalists, not just politicians who are up on the side but scientists themselves. Especially because there's so much, we talked about this a little bit in the beginning before we started recording, that a big part of science is actually having some degree of uncertainty, some degree of not knowing. I mean that's actually a big part of science in general is figuring out what we don't know.

And so I think people wanted facts at the beginning of the pandemic. And that's how we are taught science in high school is this is just a boatload of facts that you have to memorize. And it's really a process and it's an evolving process and one in which you go into the trenches and you're trying to figure out nature but you're also fighting nature. It's trying to figure this stuff out and there's uncertainty involved with that. And I feel like if scientists were getting to people, we could say more about both the uncertainty and also about some of the educated guesses that we can make based on what's out there.

Erin Welsh

You point out in the introduction that we shouldn't be asking 'why do we forget?' or 'why am I so forgetful?' but rather the more interesting question and also of course the inspiration for your book's title, why do we remember? And for the full answer to that question, I'll direct our listeners to your wonderful book. But for now could you just give us a brief overview?

Charan Ranganath

Happy to. So basically when I was approached to write a book, there was a little bit of a talk of writing a book to tell people to improve their memories. And I'm all for that but that book has been written by a lot of people. And really I wanted to give people a scientific perspective on what memory seems to be for and combating a lot of myths people have about memory. I think a lot of us expect that we're supposed to remember everything and it's supposed to be effortless. And the earliest scientific studies of memory where we started to quantify how much people remember, it was pretty well known that about 60% of what you've experienced will be forgotten in 24 hours.

So that is probably the best case scenario in certain ways. But here's the thing, if the science has shown this over and over and over again, most of what we experience, we won't remember. That we will forget, I should say. Then the real question is why do we remember anything in the first place? And I think that the answer to this has come out not so much in terms of memories replaying the past as much as about memory being this resource that we are expected to draw upon in the present and the future.

Erin Welsh

Let's take a quick break. And when we get back, there's still so much to discuss.

TPWKY

(transition theme)

Erin Welsh

Welcome back, everyone. I've been chatting with Dr. Charan Ranganath about his book 'Why We Remember: Unlocking Memory's Power to Hold on to What Matters'. Let's get back into things. You also mentioned different types of memory or broad categories of memory. First, what are those different types of memory? And how do we use each of these types of memories in different ways?

Charan Ranganath

In the book I talk about especially what I study which is episodic memory, which is your ability to recall a specific event, recall your first date or recall that time that the Dallas Cowboys won the Super Bowl or whatever it is that you look back on and reminisce about, right. And those are events that are singular experiences in your life. Now I should say in neuroscience we're often obsessed with just splitting all these different kinds of memory into different boxes and so forth. I think in the real world, there's a lot more interaction than we think between these different kinds of memories. So this is a little bit of an abstraction I should say, right. And I'll get into that more I'm sure later in the conversation. But there's another kind of memory that I'm interested in too which is semantic memory, which is our general knowledge about the world, right.

So your general knowledge about the world, you can apply anywhere. But episodic memory is specific to a time and a place. And what's cool about that is semantic memory is something that you learn very slowly, kind of like the way chat GPT learns about language, it's like feeding it gobs and gobs of information. But episodic memory gives you this ability to mentally stop on a dime and take a U-turn if you need to. In other words, once you learn about something that's kind of exceptional, you can change; you can rotate your worldview in really interesting ways, right. So you're dating someone, right, and then you find out that they've been texting with someone else on a dating app or something like that, right. Now you want to go back and change a lot of your assessments of this person that you were dating. And so that's just one example of how having these different kinds of memories allow you much more flexibility and allow you to learn quickly.

Erin Welsh

Memory evolved in a different evolutionary context than the one that we currently find ourselves in. How did our ancestors use memory differently than we do now? And what implications does that have for us modern humans trying to remember that person that we just met at a work function and we're like oh, their name, I can't remember their name. What is their face? Like everything. How does this affect what our memory prioritizes?

Charan Ranganath

It's useful to start off with just how our memories are formed in the first place. And one of the... No matter what kind of memory you're talking about, the general theory goes is that you have neurons which are the basic computational unit of the brain. There are all these individual cells in our brain but they are connected to each other in a way that allows them to talk to each other. And we think that through experience, no matter what kind of a small or big neural circuit you're talking about, those connections are tweaked and they change. And what that allows us to do is build associations between different things that we're experiencing. So even very, very so-called primitive organisms can learn the basic, hey, this thing is going to cause this effect in the world. This thing is going to be dangerous to me. This thing is going to be a good source of food or whatever, right. So those are just some basic ways in which memories can be formed even in very simple nervous systems.

But what's interesting is that a lot of times that plasticity, the changes in those connections, is temporary. And often a way in which those connections, the changes are stabilized comes from the release of these chemicals called neuromodulators. So I know you've talked about some of these in your show, dopamines is one, for instance, serotonin, norepinephrine. These are things that people have often heard about I think. And these are chemicals that are released in our brain that they don't cause neurons to just fire more or fire less but they change the way processing happens but they also stabilize plasticity. So why that's important is because these chemicals tend to be released, these neuromodulators as we call them, tend to be released at particularly important times, times when you are encountering something that gets you in a state of desire or something when you're angry, you're scared, when you're stressed out.

There are even certain hormonal effects. There's lots of stuff that happens, we're still figuring it out but there's lots of stuff that happens after pregnancy that changes plasticity. There's so many different kinds of chemicals that can produce these changes but they're all related to something important. And so that right there to me is kind of a hint that maybe memory is not about hoarding every experience that you have but being more selective in terms of taking what you need. If you think about you brought up evolution and I like to think of evolution mainly because it brings up this aspect of design constraints, right. So you can't have something that's great for hauling cargo and be the fastest car around. You gotta make some choices. And so as a result, it's like in the brain, you could have something which is just like our phones, this massive storage capability that stores everything we experienced exactly as we experienced. And that's a hoarder strategy.

So you just hoard all these memories and then what do you do with them, well you can't really use them when you need them because you can't find what you're looking for. Or you could have this Marie Kondo strategy of just taking these things that are valuable to you and bringing those along and saying goodbye to the rest. And I think that's the strategy that our brain has used. And you could see this quality over quantity trade-off everywhere in the brain. Just in terms of even attention. We often think that everything we see, we are seeing everything in front of us. But really our eyes are moving around and just grabbing little high resolution bits of the world. And then our brain is using memory to some extent to really build a picture of what's in front of us right now.

Erin Welsh

You explained a bit how memories are formed. How is a memory recalled and do the processes or the parts of the brain involved differ depending upon the type of memory, episodic or semantic?

Charan Ranganath

Great questions. So let's start with episodic memory. So there's an area of the brain called the hippocampus which is probably one of the most glamorous areas of the brain, it's probably one of the most studied areas of the brain. And this area on the one hand, it's evolutionarily very old, I mean even fish have a rudimentary hippocampus, birds, let alone humans, right. And so some of the theories go that the hippocampus evolved to tell us where we are. And I think the more modern perspective is it helps us track things in space and time. And so the hippocampus is basically saying we don't have a clock in our heads, we don't have a GPS in our heads. So to figure out where we are and when things are happening, it sort of has to put together all this arbitrary stuff that's happening and just glue it together and provide a little index that links everything just because they occurred at a particular place in time, right.

And that's what we would call the context, so to speak. As we're talking, you might have the scent of your dog in the background or something like that, right. You might have other things that are going on. You've got like this room in front of you, you've got this big microphone in front of you. There are things that are just sort of in the background but that's part of that context. And so one of the key features of episodic memory that explains a lot of its weirdness is that it's very sensitive to this context.

So things like music, smells, being in a particular place. Those are all to the extent that they are unique contexts. They can just bring you back in time and give you the sense of literal time travel where all of a sudden you're pushed back into a place and time that you haven't visited in a long time, right. Songs are great for this because we tend to listen to songs during certain periods of our life. And so they're just these great tools for reminiscence because of that, because they were just the context, the soundtrack to our lives during these particular windows of time. So that's episodic memory.

But there are other parts of the puzzle too. So sometimes our memories of these events are associated with things that again drive these sort of survival systems. And in particular, for instance, you can have things that scare us or stress us out, right. And so when we retrieve those memories, they're accompanied by this sense, this visceral sense of remembering that's often like my heart's racing or I'm just really aroused or stressed or worried or whatever it is, right. And there's an area of the brain called the amygdala which seems to work with the hippocampus but it really ties a lot of the important parts of a memory to those visceral responses that we have. So that the memory, when you retrieve it, you not only get this kind of a sense of mental time travel and so forth but you also feel like you're there and you have a lot of those physiological senses of remembering, so to speak.

And why that's important is that they are different from each other in that you can have a sense of remembering without that amygdala component and you can have that amygdala component giving you the physiological associations of a memory without actually remembering an event too. So they're different. But the interesting thing is people tend to feel like if they remember something and they have this big emotional response that somehow that memory becomes more vivid. So it's like they're two different things but because they work together, they give you this integrated feeling of remembering.

Erin Welsh

Let's take a quick break here. We'll be back before you know it.

TPWKY

(transition theme)

Erin Welsh

Welcome back. I'm here chatting with Dr. Charan Ranganath about his book 'Why We Remember'. Let's jump back into some questions. You write that to make memories that stand out, we need attention and intention. Can you give an example of what each of those is?

Charan Ranganath

Yes. So let me backtrack for just a second again to give the listeners some context which is that imagine you have like a desk and it's just cluttered with all these... I don't have to imagine, it's like I'm looking at one right in front of me.

Erin Welsh

Me either. Yeah.

Charan Ranganath

But imagine that you just have your desk and it's cluttered with a bunch of junk and it's all the same color, it all looks about the same. And you're trying to find one post-it note in this big messy desk, it's going to be really hard. But now imagine you have like a fluorescent pink post-it note sitting on this desk that has a bunch of white papers on it. It sticks out more, it's easier to find, right? And so memories are the same way because memories exist in this kind of ecosystem. It's not like there's just these individual memory traces, it's like the neurons are these different coalitions that are almost competing against each other. In the science we call that interference. So the best way for a memory to be something that you can access very easily is for it to be distinctive. And the more of the kind of sensory details that you have, the more you're focusing on the things that are unique about this moment, the easier it is, right?

So when I talk about attention, what I'm saying is that attention is the first gate I guess you could say to what we remember because we're going to get the most information into our brains about what we're focusing on in the moment. Now the problem is that often things grab our attention and often we're just kind of going around willy nilly and the world is doing things to us, right? So you walk in, your dog starts barking, you gotta let it out to do its business. And then all of a sudden you get like a text message, blah, blah, blah. And then next thing, you're asking yourself where's my keys, right? And that's like something that happens to me all the time. I'm still trying to find a pair of glasses that I can't find, it's terrible, right. So I live this, I'm living that truth.

But there is a separate piece of the puzzle which is intention, which is actually focusing and controlling your attention on the parts of your experience that you want to take with you and the parts of the experience that are the most distinctive. And so why that matters is if I'm trying to remember where I put my keys, I put my keys in thousands of places. And so the real question is what makes this moment in time different from all these other times that I put away my keys? And so if you're not focusing, you will not get that distinctive piece of information. And so one of the things that you find is there's an area called the prefrontal cortex that's super critical for being able to focus on what's relevant to you at the moment.

And as we get older, frontal function declines. And so what you start to see is older adults tend to be worse than younger adults and remembering the things that they're supposed to be paying attention to. But they're often just as good or even sometimes better at remembering things that they're not supposed to be paying attention to. And I think we've all had those things where sometimes it's like you can't find your keys but you can remember some bizarre thing that happened while you're putting away your keys and that just stuck with you, right. So that's a good example of that distinction.

Erin Welsh

You mentioned fish earlier just as an example. But I wanted to ask about some of the ways that we can compare our human memory to the memory of other animal species. And what can other animals' memories tell us about what they use memory for?

Charan Ranganath

That's a great question. And I'll say that to some extent there's a lot of disagreement about these kinds of questions. I've met people who will study fruit flies and they'll say okay, so we can study this model system. And it's basically telling us a whole lot about the way humans remember. And of course you can find people who say the opposite. And I won't go too far because I think everyone would agree that a fruit fly doesn't think like a person. But they'll often extrapolate quite a bit about these differences, right. And so there's a lot that we don't know. But what I would say is that first of all, there's different sensory information that comes into the brain in different kinds of animals.

So for instance, bats use echolocation. And so someone that I work with, Maya Geva-Sagiv did these beautiful studies in bats. And she found that in fact bats seem to have a map of where they are in the hippocampus that seems to be different depending on whether they're using echolocation or whether they're using a different sense. So that gives you one kind of example, right. But I think in terms of humans, what makes us especially interesting are that we're social animals and that we have areas like the prefrontal cortex that are so developed. I mean the prefrontal cortex takes up about 1/3 of the brain in humans. In dogs, say, or in cats, not a whole lot, right. Which explains a lot of like your cat's attentional problems compared to people, believe it or not.

So that gives you the ability to put together information and memory across a big timeline. And the social element of memory means that when we share memories with each other, that collectively creates something that we didn't have before, it changes the memory through our interactions. And in fact you could argue that language, one of the main reasons it evolved, certainly one of the main things that takes up our time speaking is sharing memories.

Erin Welsh

You talked a little bit about emotions and how extremely strong or very like visceral emotions can help kind of make a memory more indelible or more intense. How do these emotions also affect our recall of memories, our emotions both in the present day when thinking about a memory or when we experience that memory in the first place?

Charan Ranganath

There are definitely things that we experience in the present when we remember a past event. And we and others have done studies that show that even when people don't remember a lot of the details of a past event, if it brings up this emotional arousal, they will feel like they're vividly remembering that event. So in other words, it can actually take over the sense of vividness even if people don't actually have that information available. So it can take on a new life in some ways when we recall an event. And in people with PTSD, this is a gigantic problem.

It's true in a lot of anxiety disorders but especially PTSD because what we think may happen in PTSD is, as I said, the hippocampus seems to lock in events and memories for events in a particular context. But let's say if you're chronically stressed for a long period of time, that can have a neurotoxic effect on the hippocampus. And there are probably other factors too, not everybody who experiences a traumatic event gets PTSD. But for whatever reason, these memories become kind of detached from the context, meaning that things that weren't related to the event can serve as reminders. And so these memories pop up recurrently all the time, right. And so there's a part of the story which is probably that you had this traumatic experience and your brain thinks that's important and it should have a bias to bring it back. So these memories are very hard even in animal studies to wipe out. But in PTSD, I think the big problem is that they become overgeneralized.

Just as an example, I talk about in the book when I was working at a VA hospital for my training, I worked with Vietnam vets. And one of the things that was really upsetting was the 4th of July because fireworks would bring them back and bring back flashbacks of Vietnam and combat experience for those who had experienced combat-related PTSD. And you could say well 4th of July completely in the United States in some suburban part, totally different from Vietnam combat situation. But there was enough of that generalization that happened that again gave the emotion a life of its own, so to speak. And so these emotional memories can often pop up unexpectedly, leading us to have intense fear responses or panic or ruminate or many other things.

Erin Welsh

And some people form such a strong emotional response to that. Is that like, is there an evolutionary explanation or hypothesis to explain why that is?

Charan Ranganath

I think probably the most obvious one would be just that... So let me give you actually like more of a concrete example that we could probably illustrate this, right. It's like you're foraging around for food, right, you're this cave person, Homo erectus, whatever. You're going around foraging for food and you go into this place that looks like it's got some good food and then you see a snake and it like almost bites you, you just get away, right? So you want to remember not only that you got attacked by a snake but you want to remember where you got attacked by the snake and what led you to be attacked by the snake, right? So that you can avoid those things in the long run. And that's what I mean by memory being about the future. It's pointless to just go oh, I remember that time that I got almost bitten by a snake. It's important to be able to go, boy, I better not go back to that place again just in case there could be other snakes there.

And that I think is the evolutionary importance of memory. But likewise, you could also flip it around the other way and go hey, look, I found an orange. I better go back, I like oranges. And those are again another kind of part of the memory that you want to keep. I think where we get stuck in more modern life is those things that I just talked about are about survival, right. You could be a rat or like we talked about the fish or something like that. You don't have to have this deep emotional response to have these kinds of learning that take place. But in humans, we obviously intellectualize things to a great degree. And so being in a toxic work environment can be very similar biologically to being in an environment where there are actual physical threats in front of you. And so that's where a lot of the emotional baggage that comes with memory can be really problematic.

But a big part of this, which I think is super important and this is again, one of the reasons why I really, one of the messages I really wanted to convey in the book is there's the data of what happened and episodic memory in particular is great for giving you that data of what happened. But then there's the theories that we come up with to explain that data. And I think we often confuse that theory with the data itself, if you know what I mean. So in other words, it's like you have this emotional response and you say well this person hurt my feelings or something like that. And those are two different things, right? And I think that's especially where there's a mismatch between what our brains were designed to do and how we end up using them.

Erin Welsh

Before reading your book, I don't think or maybe I guess I don't remember if I've ever come across the world of competitive memory. What are memory competitions and what can they tell us about how we can train or improve our memory abilities?

Charan Ranganath

So memory competitions are these... Right now there's a whole thing about memory athletes, that's what they call themselves. And so they have these competitions where they're given massive amounts of information to memorize like at once. And so there's a guy, Joshua Foer, who wrote a book called 'Moonwalking with Einstein' that he actually decided to enter this world of memory competitions. And they'll do things like they'll memorize the order of a deck of cards or something like that or just an incredibly long string of numbers or a whole bunch of names and faces and so forth. What's interesting, and again it comes up in that book, is you hear the stories of these memory athletes and one person after another, they all say there's nothing special about me. I just learn these tricks and anyone can learn them. And you see a lot of people who will say these memory athletes, when they're interviewed, they'll say well I just read this book one day and it had all these tricks on how to improve my memory. And then I just started using it in these competitions. And they just got in this world of competitive memory.

So the reason that memory athletes are able to do what they do, these people who are really good in these competitions that seem to have this ability to memorize like the order of an entire deck of cards or something like that. That's a lot of information, right? And they learn it, they memorize it very, very quickly, like in a minute or something. It's just exceptionally quickly. But the reason they are able to do that is that they've mastered these strategies that actually allow them to memorize less. And not just that but they allow them to organize what they are memorizing into little manageable packets that can take this massive amount of information and compress it and organize it into something that they can easily access.

And I know that sounds very abstract but you can give a real world example of this. An example I talked about in the book is LeBron James. And if anyone goes on YouTube and sees videos of him describing his past games, it's stunning. You'll see these videos of him talking about the game from memory and then the video footage of the game in parallel. And the amount of detail that he's able to produce is just unbelievable. And the reason is he knows so much about the game that he knows what to focus on and he knows how everything is meaningfully related to each other. So in real time he's actually dissecting what's going on and applying what we call schemas, which are this sort of organized knowledge, to decompose what's there, reduce the complexity and say how is everything related to each other?

And if you go back to these memory athletes, what they do is they learn strategies like that. They'll make up a story to link up all of these things that they have to memorize or you can use songs, songs is a great one to memorize large amounts of information. There's a technique called the method of loci where people imagine putting things in different rooms in their house and then taking a mental walk through the house to find all these things. So what you're trying to do is take this stuff that's kind of meaningless and boring and assimilate it into some structure of knowledge that you have really well so that it's organized and laid out in a way that you can find it later.

Erin Welsh

I'm glad you mentioned schemas because I really wanted to ask about some of the downsides of schemas. You mentioned this in the book, how like there are these incredible things, we use and reuse them subconsciously, they help us organize and streamline new information. But then there are some downsides. What are some of those?

Charan Ranganath

So schemas are these organized knowledge structures that again simplify everything and they allow you to put meaning into your experiences, right. And that gives you a lot of capability for prediction and making inferences. So for instance if I were to go to a cafe, I order a cappuccino and I say give me soft foam or whatever and I pay the person. I can predict based on my knowledge about what happens during cafe events that eventually a barista is gonna give me that coffee. And now I don't know, I mean really you're trying to predict the future and it could be completely wrong. But it turns out that we're actually very good at predicting the future with schemas. And 9 times out of 10, you will get that cappuccino. And you wouldn't expect this person to throw the cappuccino in your face. You wouldn't expect a whole lot of things that are unlikely to happen.

So that's the benefit of schemas is that they really help us not only for the past but also in real time. And then when we remember these events, schemas are like the sort of structure that episodic memories are built on. So you can imagine like if you go see a house initially as it's being built, there's just all these like wood planks and so forth that are holding up the structure. But then people put in the drywall and they paint it and so forth. And that painted house would be like an episodic memory but the structure is really built by these schemas. So that's all good and schemas help us remember a lot of stuff in part because it helps us focus on what we didn't already know. So if I have a schema for cafes, I don't need to memorize the coffees involved because that's an integral part of a cafe that does coffee. Or for people who don't drink coffee, whatever it is, right. So that gives you this ability to make inferences.

But the problem is sometimes we make inferences that are just wrong and things creep into our memories that are not based on what actually happened but based on our understanding of what happened, right. And so that's where we can be inaccurate at times. And many, many experiments have shown this. And what's really weird about the way memory works is that for instance the hippocampus can often help us get a few details of things that happened at a particular time and place. But then we make a story out of it. So we talked about storytelling before and that's a big part of episodic memories, the storytelling component where we use schemas to make a story about what's happening right now. And that story can often be completely wrong because we're not replaying the past, we're imagining how the past could have been. That storytelling is an act of imagination. And sometimes we imagine things to fill in the blanks of our memories that weren't there at all. And so it actually creates this big problem for us which is how do we even tell the difference between imagination and memory in the first place?

Erin Welsh

Yeah. And that is a really important topic. Recall and corrupted memories and how do we know if it's imagination or memory? Big topic in terms of eyewitness accounts. So is that how memory corruption happens? And how do we approach that? Like what can we do about that?

Charan Ranganath

So memory corruption, I will say corruption is a rather pejorative term, right. Because there's a lot of good parts that come with this imagination process in that it's like we get a lot of meaning from these experiences that's often it's either neither true nor false or it's things that are actually true and very useful. So I should say it's not always corrupting. But yes, sometimes it does introduce noise, it introduces elements that weren't there before, right. And that happens when we remember something. But also what happens is the act of remembering itself can change how we remember it again later on. So the act of remembering can strengthen that memory and make it more accessible later.

But it can also make it harder to remember competing memories, cause forgetting. And it can also change the memory that you're trying to remember later on so that the stuff that you imagine becomes incorporated into your memory of the event itself. And so now you can take a thing that you've recalled over and over again like the stories of your childhood that your parents probably tell over and over and over again. And what happens is often little bits of stuff that people thought about or just filled in the blanks with can now start to corrupt that memory and it starts to become more and more detached from what actually happened.

Erin Welsh

Can like quote unquote "lost" memories ever truly become recovered through like recovered memory therapy or are they gone forever?

Charan Ranganath

So there's definitely evidence that a memory that's seemingly lost can be pulled up much later. And in fact I think many of us have had this experience of you smell something and all of a sudden it brings you back and you recall something that you're like how did I... Where did this memory come from? Right? So these things can happen. And in fact sometimes also what happens is you'll remember something and be like oh, that came to mind, that's weird, I didn't think about that before. When actually it is something that came to mind before but you forgot that you actually remembered it. So that would be a case where you didn't really recover the memory, so to speak, it just was there all along and you forgot that it was there. That was all the weird... Memory is strange. I mean it's just strange things happen.

So the problem with recovered memory therapy, which you brought up, is this is a special kind of approach. And it's based on the assumption that you often hear this, that it's like the body is trying to protect you or that the mind has got these protective mechanisms that when you experience trauma, that you just block that memory and it becomes repressed and then it manifests itself in all these ways that are very... Kind of like people end up feeling anxious or insecure or aggressive, unstable. And so the assumption is if they manifest any of these beliefs, they must have had a traumatic memory that caused them to be like this, right. And so the problem is that then what they do is they dedicate, a lot of that memory therapy is dedicated to rooting out what they think of as the repressed memory, right.

So scientifically speaking, there's no evidence that there's some automatic mechanism that just represses a memory that's traumatic. If anything, most people who've experienced trauma just can't forget it, as we've talked about, right. And often when people don't remember something like this, it's not necessarily, it can be explained by a lot of mechanisms that just cause forgetting in everyday experiences. But what we know about the way memories can become corrupted is first of all if I just ask you to remember something that never happened, you will try to imagine a scenario, try to cure yourself like oh this must have happened, maybe I can think about how it could have happened, right.

And so how do you do that? Well you'll take bits of other memories that you have to imagine how this thing could have happened. You take some of your knowledge about, let's say, I don't know, your parents or local teacher or something like that and you start to put these things together to think of what could have happened. And you're being given suggestions from someone you trust, which is this therapist, about what could have happened and they're collaborating with you to create the story, right. Sometimes there's hypnosis involved and so you're turning off a lot of the mechanisms that you'd have to be more critical and thinking about these things, right.

So then you come back over and over and over again. You keep revisiting that same story and you start to develop a memory that's not based on something that you experienced but it's a memory that is of stories that you generated in previous sessions. And so over and over and over again, what happens is people can develop these very rich, very detailed memories for things that sometimes you arguably couldn't have happened like UFO abductions or something like that. And basically the main core tenets of recovered memory therapy are virtually identical to the recipe that you'd use in a lab to generate false memories in people.

Erin Welsh

At the end of your book, you discuss collective memory and how memory errors can be transmitted throughout a group. Something that we saw and continue to see, for example, about the COVID vaccine. How are misinformation or disinformation campaigns taking advantage of this tendency of groups to transmit and amplify memory errors?

Charan Ranganath

So one of the interesting aspects of memory is that we don't often... We can remember something without remembering where it came from, right? And so for instance, you see something on social media and a week later you might remember that story but not remember that you saw it on social media, you might remember it as something that you read in the news or something that you heard about. And so we often have this loss of information that leads us to think things are more valid than they really are. And there's an added part of it which is the more times you hear something, especially from trusted sources, what happens is it becomes more easy to access that belief, it becomes easier to access that information. And this is just the natural way our brains work is it's constantly trying to optimize it. So the more you're exposed to something, the easier it is to process that information.

So you hear the same thing from a bunch of different sources and then all of a sudden it's just easier to believe the more times you hear it because it just feels right. And so there tends to be this tendency where the more people and sources you hear the same thing from, the more it seems to be valid. So if you're in a social network and everyone's sharing information about some apocryphal stories about someone who died from the COVID vaccine or whatever, right, then all of a sudden it takes on a degree of believability because you've just heard it so much.

And let's face it, how many of the beliefs that we have we don't really have the original data to show it, right? So I believe that viruses cause the common cold but I don't actually know the data or the chain of events that leads for this viral RNA transfer or whatever to like actually manifesting the symptoms of a cold. So there's always some degree of belief that we have that gives us some sense of what's real. But I think where misinformation really thrives is from the ability of groups to amplify that information, especially the most emotionally-laden information is the most likely to be transmitted from one person to another.

Erin Welsh

Is there anything that we can do about that? Like does fact checking help to a degree?

Charan Ranganath

Fact checking definitely can help. But the research that we've seen so far suggests that it often helps to get fact checks after you've been exposed, I should just verify this. I can't remember for sure if it's before or after. But if memory serves, if you get the message after you've already read it, it can be more effective than if you get it before you've read it. So these external fact checks can be very useful. One thing I'll say though is that there's another way to inoculate yourself against misinformation, which is to be exposed to a number of different perspectives. Because again, what often happens is if we're hearing the same, the same information is just circulating through this very closed social network, it starts to get more believable.

But what we've seen in studies of misinformation is if you get groups of people that are fairly diverse and everybody gets a chance to speak, what happens is that a lot of that false information tends to drop out because people can contradict it. And where you tend to get more of these confirmation biases tend to be in more homogeneous groups. And I think this is something that we're not really great at is we're not very comfortable with being uncomfortable. And so finding people who come from different backgrounds that you're interacting with, it can often be uncomfortable and having people tell you things that disagree with your beliefs can be uncomfortable. As a scientist, I know this is my job, this is what I have to do is deal with uncomfortable data and speak with people of different perspectives. But that's definitely the key to combating misinformation right now.

TPWKY

(transition theme)

Erin Welsh

That was so much fun. Thank you so very much, Dr. Ranganath, for taking the time to chat with me today. I am honestly absolutely fascinated by everything we chatted about and I also feel like I kind of understand some of how our brains work for the first time ever, which is a pretty cool feeling. For those of you out there that want to learn more about memory and why we remember, check out our website thispodcastwillkillyou.com where I'll post a link to where you can find 'Why We Remember' as well as a link to Dr. Ranganath's website.

And don't forget, you can check out our website for all sorts of other cool things including but not limited to transcripts, quarantini and placebo recipes, show notes and references for all of our episodes, links to merch, our bookshop.org affiliate account, our Goodreads list, a firsthand account form, and music by Bloodmobile. Speaking of which, thank you to Bloodmobile for providing the music for this episode and all of our episodes. Thank you to Lianna Squillace and Tom Breyfogle for our audio mixing. And thanks to you, listeners, for listening. I hope you liked this bonus episode and are loving being part of the TPWKY Book Club. A special thank you as always to our fantastic, generous patrons. We truly appreciate your support so much. Well until next time, keep washing those hands.